REMARKS

Claims 1, 4-6, 8, 9, 14-26, 28-30, 32, and 66-79 are pending. Claims 1, 4-6, 8, 9, 14-26, 28-30, 32, and 66-77 have been rejected. Claims 78-79 are new.

Claims 68 and 77 have been amended. Claim 77 has been amended to correct a typographical error.

No new matter has been added by the amendments, and applicant requests that the amendments be entered and considered.

A declaration under 37 C.F.R. § 1.132 from A.C. Makrides, his *curriculum vitae*, and reference pages from the text Electrochemical Systems, 2nd ed. are also attached together with this response. Applicant requests that the Examiner review and consider the information contained therein, as well as the response below.

Interview

Applicant thanks the Examiner for the discussion held May 23, 2005 between the Examiner and applicant's representative Gary Quick, during which possible claim amendments were discussed.

Applicant also thanks the Examiner for the discussion held June 17, 2005 between the Examiner and applicant's representative Gary Quick, during which the Examiner indicated that affidavits submitted under 37 C.F.R. § 1.132 would be considered if filed with a response.

§112 Rejection

Claims 68-77 stands rejected under 35 U.S.C. §112, second paragraph. Claim 68 has been amended and now references a voltage applied across the bond between the first surface and the composition. As claims 69-77 depend upon claim 68, applicant requests that the rejection of these claims be withdrawn.

§102 / §103 Rejections

Claims 1, 5, 6, 8, 9, 14-22, 25, 28-30, and 32 stand rejected under 35 U.S.C. §102(b) as being anticipated by Moulton, U.S. Patent 5,441,830 ("Moulton"), as evidenced by Koga, U.S. Patent 5,565,284 ("Koga").

Claims 4, 23, 24, 66, and 67 stand rejected under 35 U.S.C. §102(b) as being anticipated or alternatively under 35 U.S.C. §103(a) as obvious in view of Moulton, U.S. Patent 5,441,830 ("Moulton"), as evidenced by Koga, U.S. Patent 5,565,284 ("Koga").

Moulton discusses methods for enhancing the adhesion of composite electrodes onto conductive (plastic) foils (Moulton Abstract). Koga discusses lithium secondary cells designed to experience minimal capacity degradation (Koga abstract). Both references address improvements in electrochemical cells (batteries, fuel cells, etc.).

In contrast, claim 1 recites a composition that has sufficient ionic conductivity "to enable a faradaic reaction at a bond formed between the composition and an electrically conductive surface and allow the composition to disbond from said surface."

A declaration under 37 C.F.R. § 1.132 from Dr. A.C. Makrides discussing background information as well as differences between the current claims and the teachings of the cited prior art references is attached. Dr. A.C. Makrides has extensive experience and knowledge in this area, and has been involved in the study and application of electrochemistry for over 50 years. His *curriculum vitae* is also attached following his declaration, and illustrates his extensive experience and publications.

As Dr. Makrides explains in his attached declaration, a fundamental fact of all electrochemical systems is that the interface between two electronically conducting phases cannot support an electrochemical (or faradaic) reaction. This fundamental fact is reflected in the requirement that an ionic electrolyte is a necessary component of all electrochemical devices (batteries, fuel cells, etc.). A potential gradient between electronic conductors causes a flow of electrical (electronic) current; a voltage gradient between an electronic conductor and an ionic conductor may cause a chemical reaction. (Declaration of A.C. Makrides, paragraph 8). As further support, pages 1-2, and 16-18 from Electrochemical Systems, 2nd ed., John S. Newman,

Prentice Hall 1991 is also attached, in which electrochemistry, current, and surface overpotential is discussed.

Therefore, the assertion that Moulton's composite electrode discloses, teaches, or suggests the claimed invention is flawed because Moulton's composite electrode – or any other composite or solid electrode – is by necessity an electronic conductor. If it is not, then it is not a useful "electrode." As an electronic conductor, it cannot support a faradaic reaction at the electrode/current collector interface. In fact, if such a reaction were possible, the device incorporating such an electrode would fail, probably catastrophically. (Declaration of A.C. Makrides, paragraph 9).

The Examiner notes that "Moulton's teaching of methods for enhancing the adhesion of composite electrodes onto conductive foils implicitly teaches that while the bond can be enhanced, eventually it can be disbonded, i.e. disbondable". This argument is not germane to the claimed invention. Any bond can eventually be disbonded in some fashion – for example, by applying sufficient force on the interface. The invention claims an easy, quick, and reliable method, namely the application of a voltage to produce a faradaic reaction at the interface. Indeed, Moulton is actually explicit about the modes of disbonding. Moulton states "when conductive plastic foils are used as the current collector, they are in direct contact with a composite electrode and are suspectable (sic) to swelling due to contact of the current collector with the electrolytic solvent found in the electrode. Such swelling adversely affects the performance of the battery" (Moulton, col. 1, lines 50-57). Also, Moulton notes that the initial bonding of a composite electrode to the current collector may be poor by stating that "the paste can become dislodged from the foil. In turn, such dislodgement will result in defects in collecting current from that cell" (Col. 1, lines 67-68, Col. 2, lines 1-2). Neither "disbonding" mechanism involves the application of voltage across the interface, or a faradaic reaction at the interface. (Declaration of A.C. Makrides, paragraph 10).

The Examiner also notes "that it is old and well known that the bond between a composite electrode and an electrically conductive surface is weakened by a faradaic reaction at the interface, as evidenced by the teaching of Koga which expressly teaches that charge-

discharge cycles exacerbates (sic) the interfacial adhesion (bond) between the current collector and the electrode layer (Col. 1, lines 39-52)." However, this statement confuses interfaces with physical effects within electrochemical cells. In fact, Koga does not refer to the interface between "a composite electrode and an electrically conductive surface" or to a faradaic reaction at this interface (which, as discussed above, is not possible). Rather, Koga is describing a bulk effect driven by the expansion and contraction of lithiated and delithiated electrode material – and which leads, over time, to the fracture of the material and shedding of "fine particles". As Koga points out, this is a result of "numerous repetition of charge-discharge cycles" (Koga, col. 1, line 42). Thus, this physical expansion and contraction is unrelated to the disbonding described in the present invention which occurs after an application of voltage across the bond interface, or a faradaic reaction at that interface. (Declaration of A.C. Makrides, paragraph 11).

There are also crucial differences between (1) a composite electrode – a structure composed up to 90% of some electrochemically active compound, usually an oxide, which is either intrinsically electronically conductive or can be made so by the addition of an electronic conductor, usually carbon, held together by a binder; and (2) a composition containing an electrolyte which supports an electrochemical (faradaic) reaction at the bonding interface. These two materials are fundamentally different, notwithstanding the inclusion, in varying amounts, of some common ingredients. Most basically, a composite electrode is not electrochemically disbondable via a faradaic reaction, even with the inclusion of binders for holding together its components, because an electrode is necessarily an electronic conductor. (Declaration of A.C. Makrides, paragraph 12).

As explained above, neither Moulton nor Koga teach, discuss, or suggest the composition as claimed in claim 1. Therefore, applicant requests that the rejection of claim 1 and associated dependent claims be withdrawn and the claims allowed.

Similar arguments apply to the composition as claimed in claim 30, and the adhesive as claimed in claim 68. For the same reasons, applicant requests that the rejection of these claims and associated dependent claims be withdrawn and the claims allowed.

Applicant requests entry of the amendments and reconsideration of all claims in light of the discussion and arguments above. The Examiner is invited to contact the undersigned if questions remain regarding the above, or if it would assist in advancing prosecution. Please apply any charges or credits to deposit account 06-1050.

Respectfully submitted,

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